OPERATING SUMMARY

BURLINGTON

(Drury Lane)

water pollution control plant

1968

ONTARIO WATER RESOURCES COMMISSION

Division of Plant Operations

Water management in Ontario

Ontario
Water Resources
Commission

135 St. Clair Ave. W.
Toronto 7
Ontario

We are pleased to present you with the Operating Summary for the water pollution control facilities operated for you during 1968.

Both the financial and technical information presented should be of assistance to your present and future planning in this important phase of municipal activity.

A new format has been devised to allow greater readability with equally detailed content. We trust that this will meet with your approval.

Our staff wish to express their appreciation for your co-operation throughout the year.

D. S. Caverly,
General Manager.

D. A. McTavish, P. Eng.,
Director,
Division of Plant Operations.

BURLINGTON DRURY LANE

water pollution control plant

operated for

THE TOWN OF BURLINGTON

by the

ONTARIO WATER RESOURCES COMMISSION

1968 ANNUAL OPERATING SUMMARY

FOREWORD

● This operating summary outlines the project's technical capabilities and financial status in 1968. Such information mirrors past and present performance, but a major intention is to anticipate the future -- to solve problems before they occur.

The new format in which this year's data are presented is designed to offer a higher level of readability than in the past, without a corresponding decrease in compactness, accuracy and detail.

Although your Regional Operations Engineer carries the major responsibility for the contents of the report, those involved in its preparation are attached to several Commission sections and divisions. The statistics section of the Division of Plant Operations compiled the information for the graphs and charts. The draughting section of the Division of Sanitary Engineering drew the graphs. The Division of Finance provided all cost data.

Only the close co-operation of these departments allowed the publication of this summary.

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'68 REVIEW

The Burlington Drury Lane Water Pollution Control Plant treated a total of 568,200,000 gallons of raw sewage during the year, at a total cost of $42,055.65. The operating cost per million gallons was $74.02, and the cost per pound of BOD removed was three cents.

The average daily flow was 1.55 million gallons with the automatic by-pass to the East End trunk sanitary sewer maintaining the hydraulic loadings to the Drury Lane plant within acceptable design limits. Although the average raw sewage strength was considerably in excess of design values the limitation on hydraulic loadings allowed the Drury Lane plant to produce an excellent effluent during most of the year. Periodic industrial shock loadings upset the biological process for short periods of time and every attempt should be made to eliminate these if the plant is to function effectively.

The plant was staffed eight hours a day, five days a week, with call-in service on weekends.

PROJECT COSTS

NET CAPITAL COST (Final)	$676,033.78
DEDUCT - Payments from Municipalities	41,721.91
Long Term Debt to OWRC	$634,311.87
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1968	$215,998.05
Net Operating	$ 42,055.65
Debt Retirement	23,013.00
Reserve	3,182.51
Interest Charged	35,612.42
TOTAL	$103,863.58

RESERVE ACCOUNT

Balance at January 1, 1968	$ 33,371.89
Deposited by Municipality	3,182.51
Interest Earned	2,037.05
	$ 38,591.45
Less Expenditures	273.40
Balance at December 31, 1968	$ 38,318.05

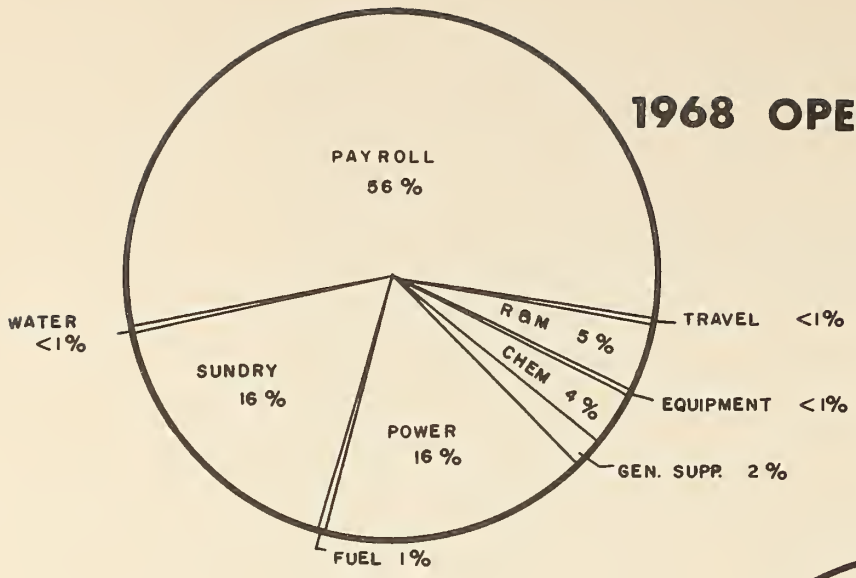
Monthly Operating Costs

MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	* SUNDRY	WATER	TRAVEL
JAN	1700.61	1500.16	121.44	-	-	-	56.34	-	-	22.67	-	-
FEB	3371.00	1548.02	211.98	57.44	529.23	-	69.67	284.04	29.91	630.82	9.89	-
MAR	4092.73	2407.78	229.95	69.75	580.63	228.38	59.93	-	1.20	496.09	8.80	10.22
APRIL	3312.58	1553.73	170.20	66.53	553.46	-	53.88	-	491.61	416.17	7.00	-
MAY	2748.39	1536.99	-	-	517.65	-	125.45	-	61.65	486.67	8.50	11.48
JUNE	3356.23	1543.29	85.10	-	531.31	414.22	42.94	(266.70)	177.89	822.88	5.30	-
JULY	3414.94	1527.00	324.12	-	505.49	238.61	58.88	-	180.10	556.52	4.90	19.32
AUG	4443.44	3186.15	460.52	-	-	119.31	39.43	-	161.86	476.17	-	-
SEPT	3899.82	1618.01	-	-	1073.85	357.92	63.61	-	327.21	429.24	10.10	19.88
OCT	3067.81	1473.53	324.80	56.61	554.26	238.61	114.03	12.00	250.18	15.24	4.90	23.65
NOV	2713.07	509.58	187.29	-	686.17	-	16.39	(12.00)	-	1320.44	5.20	-
DEC	5935.03	2938.39	107.68	-	1243.04	-	104.13	-	307.92	1221.67	12.20	-
TOTAL	42055.65	21342.63	2223.08	250.33	6775.09	1597.05	804.68	17.34	1989.53	6894.58	76.79	84.55

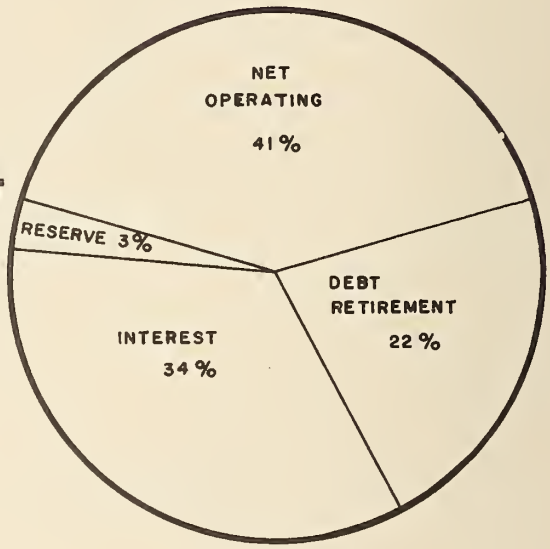
*SUNDRY INCLUDES SLUDGE HAULING COSTS WHICH WERE $5,000.00

BRACKETS INDICATE CREDIT

1968 OPERATING COSTS



TOTAL ANNUAL COST



Yearly Operating Costs

YEAR	M.G.TREATED	TOTAL COST	COST PER MILLION GALLONS	COST PER LB OF BOD REMOVED
1964	823.80	$45,026.00	$54.65	2 cents
1965	606.72	37,586.43	61.95	3 cents
1966	578.42	38,565.75	66.67	3 cents
1967	596.29	41,183.66	69.07	3 cents
1968	568.20	42,055.65	74.02	3 cents

Process Data

A total of 568.2 mg was treated at the Drury Lane plant in 1968. This represents a decrease of 4.7 percent from the 1967 total flow. The average daily flow for the year was 1.55 mg. The maximum flow for one month occurred in December with a total flow of 54.4 mg. The maximum flow for one day occurred in February with a total flow of 3.94 mg.

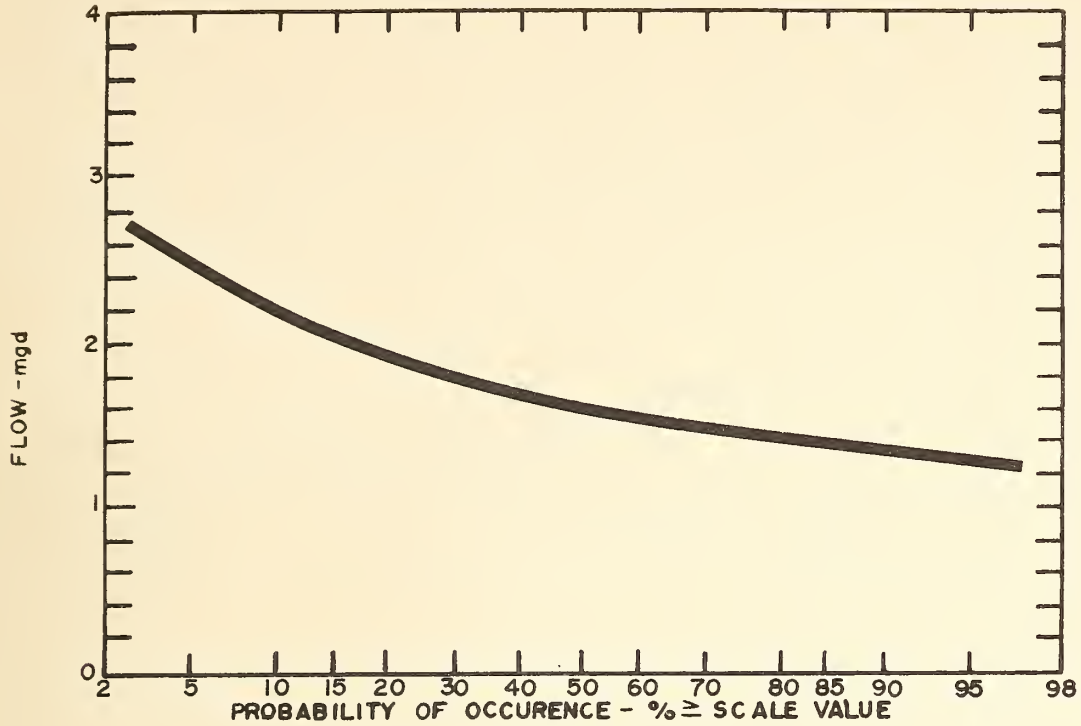
The overflow arrangement, by which flows in excess of design are bypassed to the Skyway plant, provides excellent protection against hydraulic over loading.

An average dosage of 2.4 mg/l of chlorine was required to maintain a residual of 0.5 mg/l.

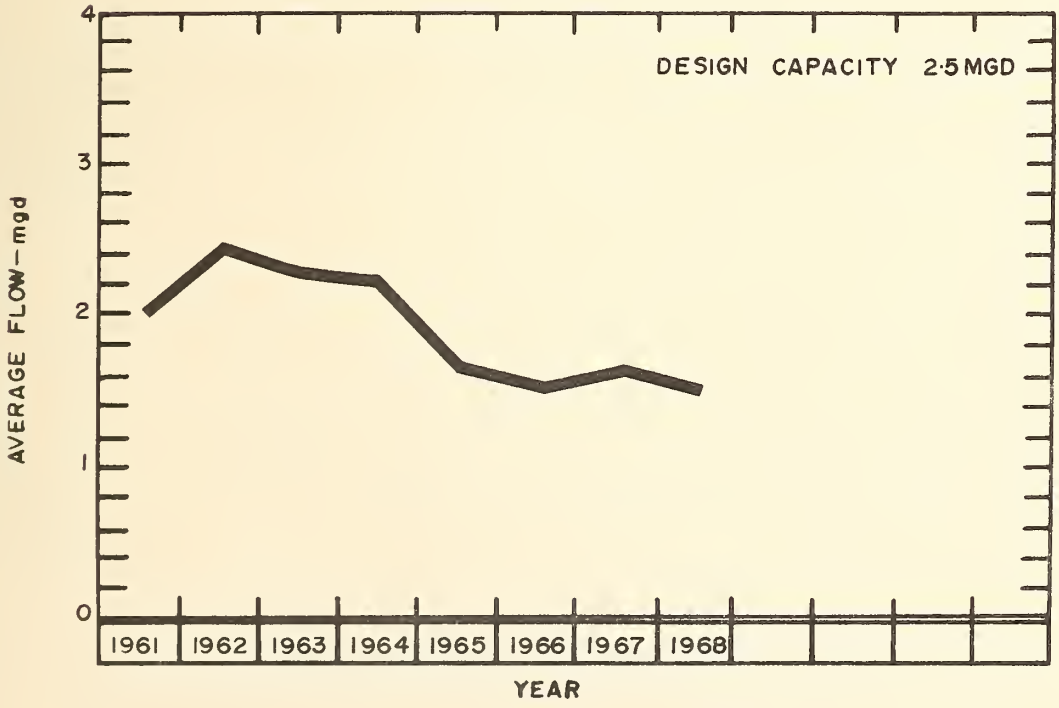
PLANT FLOWS and CHLORINATION

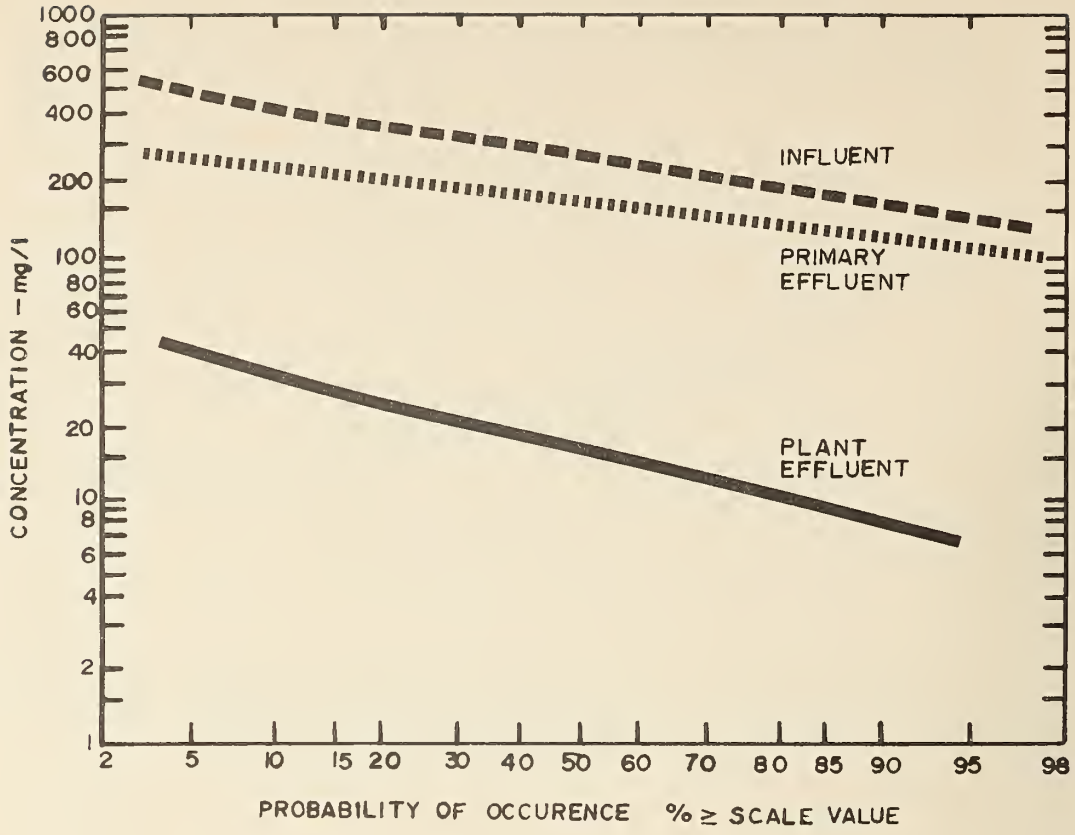
MONTH	TOTAL FLOW mg	AVERAGE DAILY FLOW mg	MAXIMUM DAILY FLOW mg	MINIMUM DAILY FLOW mg	CHLORINE USED lbs.	DOSAGE mg/l
JAN	45.2	1.46	2.23	.75	0	0
FEB	52.9	1.92	3.94	1.10	0	0
MAR	51.7	1.67	2.25	.96	0	0
APR	44.9	1.50	2.16	1.04	0	0
MAY	46.0	1.48	2.06	1.13	640	2.7
JUN	44.3	1.48	2.66	.90	945	2.1
JUL	39.0	1.26	1.77	.64	1033	2.6
AUG	45.6	1.47	2.61	.84	1258	2.8
SEPT	48.2	1.61	2.59	1.13	1452	3.0
OCT	43.2	1.39	1.82	.78	1017	2.4
NOV	52.8	1.76	3.14	1.03	0	0
DEC	54.4	1.76	2.96	1.09	0	0
TOTAL	568.2	-	-	-	6345	-
AVERAGE	-	1.55	-	-	1058*	2.4*

* 6 month's chlorination

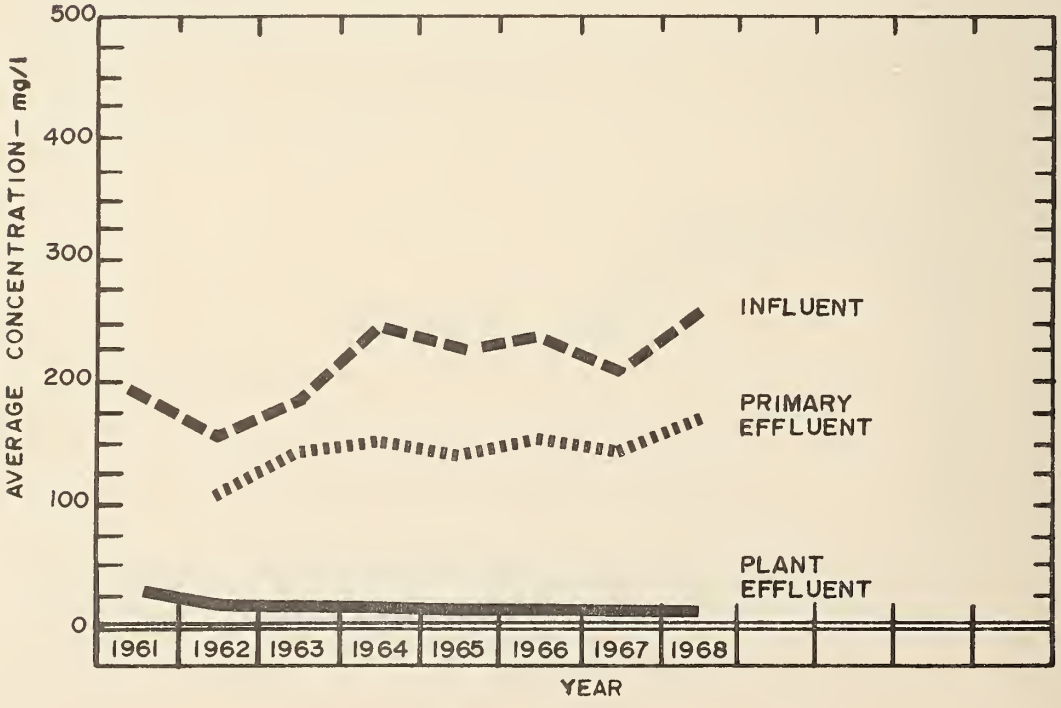

FLOW - mgd
0
1
2
3
4
2
5
10
15
20
30
40
50
60
70
80
85
90
95
98
PROBABILITY OF OCCURENCE - % ≥ SCALE VALUE

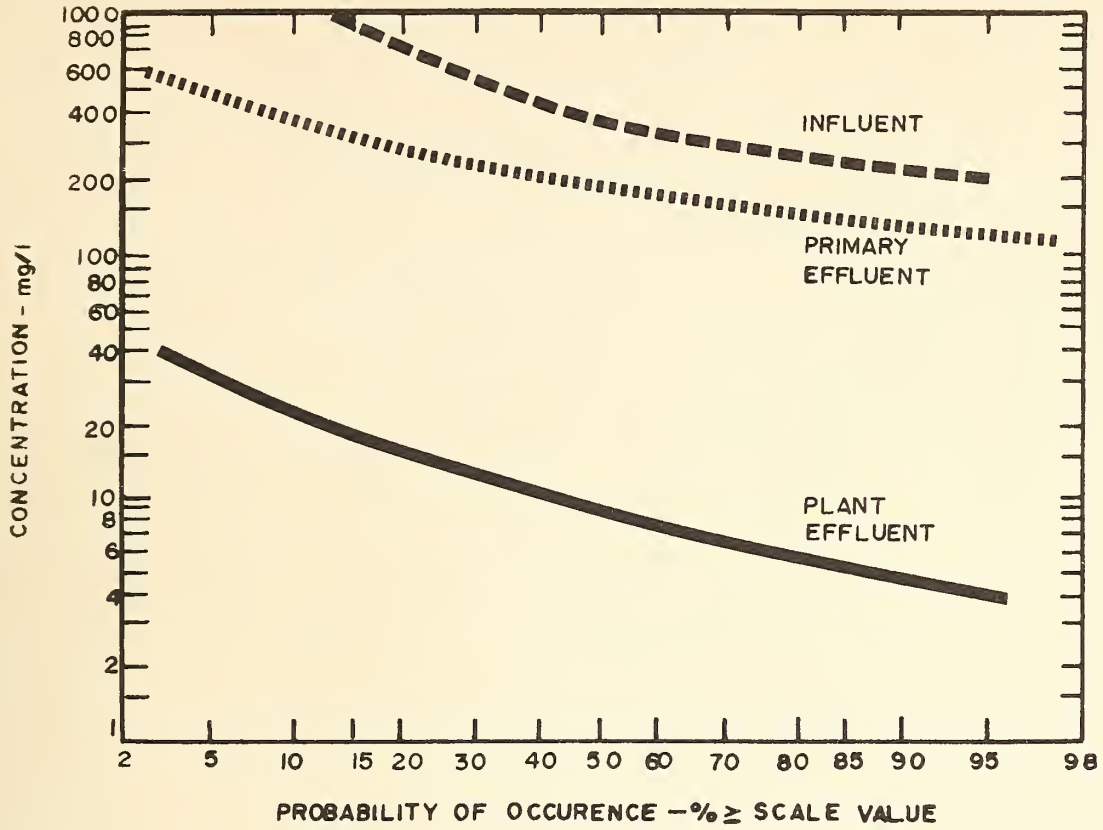
FLOWS


AVERAGE FLOW - mgd
0
1
2
3
4
DESIGN CAPACITY 2·5 MGD
1961
1962
1963
1964
1965
1966
1967
1968
YEAR

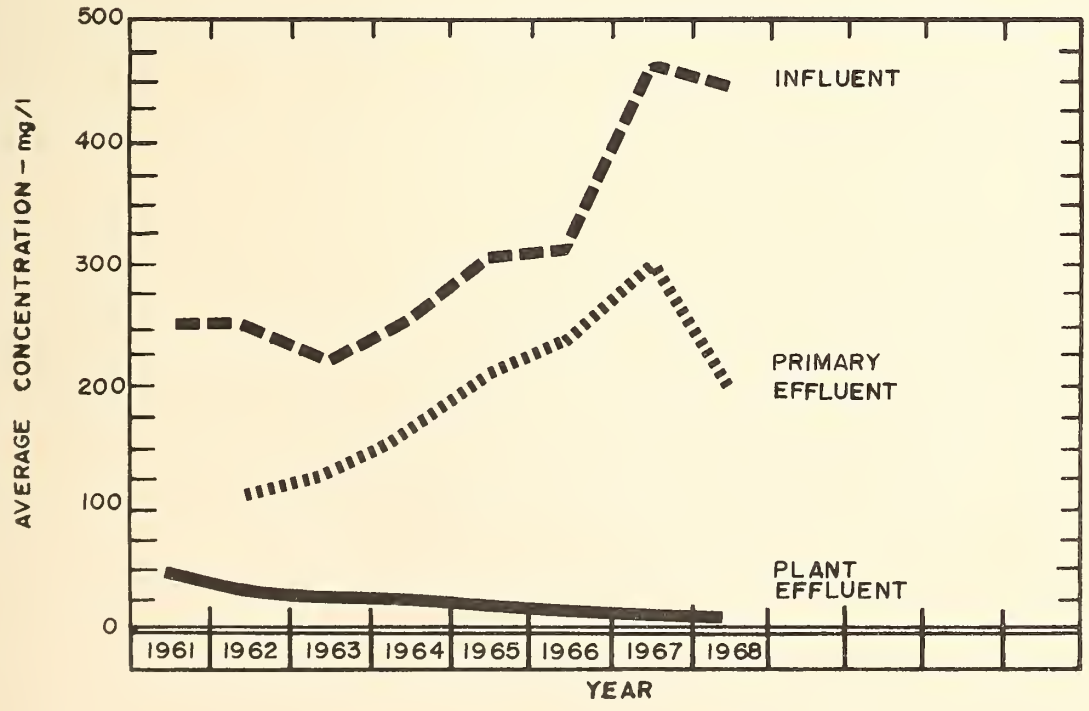


BIOCHEMICAL OXYGEN DEMAND





SUSPENDED SOLIDS



PLANT EFFICIENCY

MONTH	BIOCHEMICAL OXYGEN DEMAND				SUSPENDED SOLIDS				GRIT
	INF CONC^N mg/l	EFF CONC^N mg/l	RED^N %	REMOVAL 10^5 lb	INF CONC^N mg/l	EFF CONC^N mg/l	RED^N %	REMOVAL 10^5 lb	REMOVAL ft^3
JAN	159	16	90	0.65	288	3	99	1.29	27
FEB	365	17	95	1.84	996	21	98	5.16	52
MAR	205	16	92	.98	248	5	98	1.26	28
APR	275	4	99	1.22	242	5	98	1.06	12
MAY	244	5	98	1.10	478	8	98	2.16	16
JUN	289	18	94	1.20	757	9	99	3.31	58
JULY	227	10	96	.85	315	11	96	1.19	20
AUG	260	20	92	1.10	328	10	97	1.45	50
SEPT	295	32	89	1.27	386	12	97	1.80	40
OCT	360	16	96	1.48	761	3	99	3.27	18
NOV	212	11	95	1.06	197	9	95	.99	22
DEC	188	18	90	.93	315	16	95	1.63	36
TOTAL	-	-	-	13.68	-	-	-	24.57	379
AVERAGE	257	15	94	1.14	4.43	9	98	2.04	32

COMMENTS

The average raw sewage strength of 257 mg/l BOD substantially exceeded the design BOD of 200 mg/l BOD. The average suspended solids concentration of 443 mg/l exceeded the design concentration 100 percent of the time. Despite the organic overload the plant provided excellent treatment with an average BOD reduction of 94 percent and an average suspended solids reduction of 98 percent.

A total of 379 cu. ft. of grit was removed in 1968.

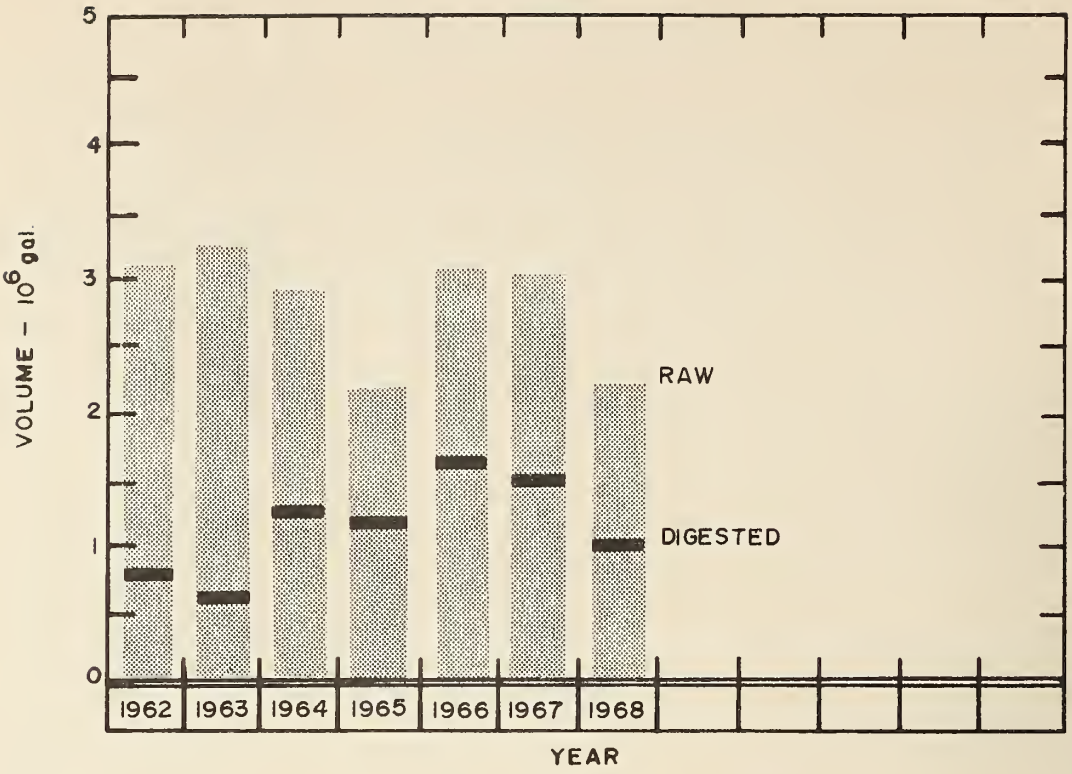
AERATION

MONTH	AVERAGE FLOW mgd	PRIMARY EFF		SECONDARY EFF		MLSS CONC^N mg/l	F/M (lb BOD / lb MLSS)	AIR USED (1000 ft / lb BOD REMOVED)	WASTE SLUDGE 10^5 lb
		BOD CONC^N mg/l	SS CONC^N mg/l	BOD CONC^N mg/l	SS CONC^N mg/l				
JAN	1.46	101	177	16	3	1,540	.21	1.82	-
FEB	1.82	143	166	17	21	1,690	.19	.84	-
MAR	1.67	157	234	16	5	2,200	.15	.93	-
APRIL	1.50	150	199	4	5	2,390	.12	1.22	-
MAY	1.48	153	169	5	8	1,940	.15	.92	-
JUN	1.48	160	183	13	11	2,060	.15	1.12	3.26
JUL	1.26	146	247	10	11	1,900	.12	1.15	1.89
AUG	1.47	340	208	20	10	1,670	.38	.47	.51
SEPT	1.61	225	352	32	12	1,800	.25	.70	.38
OCT	1.39	187	152	16	3	1,780	.19	.91	.30
NOV	1.76	155	109	11	9	1,960	.18	.86	1.13
DEC	1.76	120	155	18	16	1,620	.16	1.20	.75
TOTAL	-	-	-	-	-	-	-	-	-
AVERAGE	1.92	170	196	15	10	1,880	.19	1.01	1.17

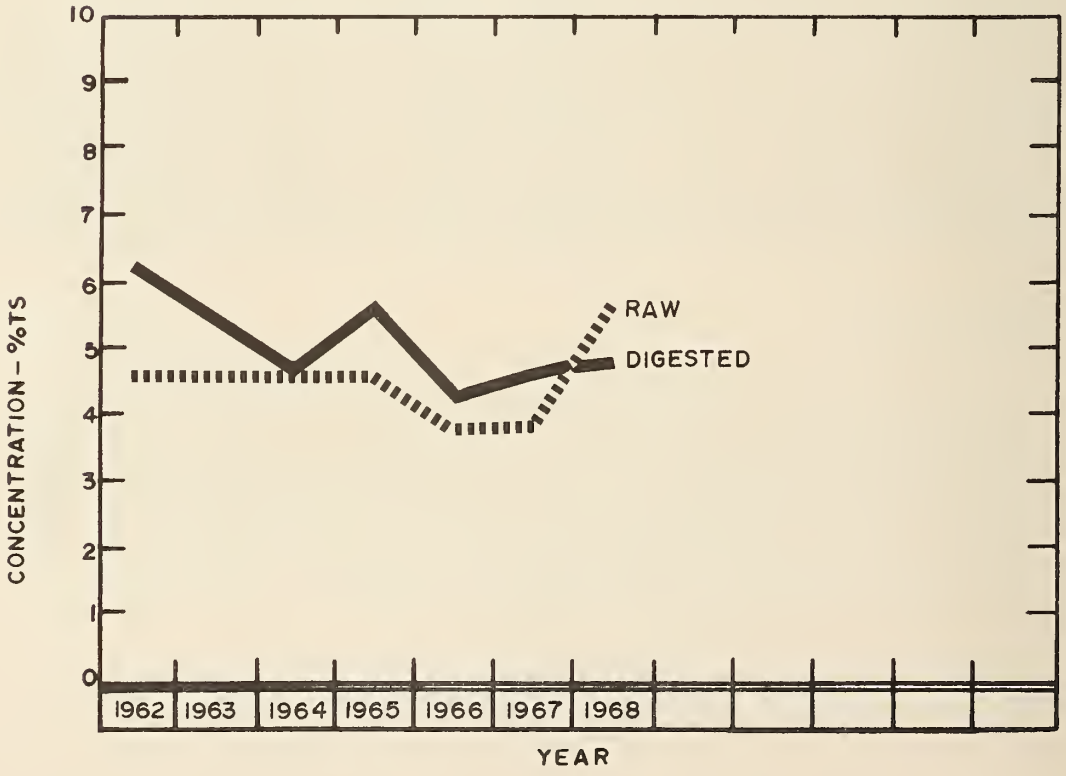
COMMENTS

The primary clarifier removal efficiency was 34 percent for the year. The MLSS fluctuated between a high of 2390 mg/l and a low of 1540, but generally indicated a fairly constant hydraulic loading. The average aeration tank loading was 0.19 pounds of BOD per pound of MLSS. This is a substantial increase over 1967 and is attributed to an increase in primary effluent strength and a decrease in MLSS concentration. The cubic feet of air required per pound of BOD removed decreased substantially from 1520 to 1010 cu. ft.

In general, the aeration section removed more BOD with less air in 1968.


VOLUME – 10^6 gal.
5
4
3
2
1
0
RAW
DIGESTED
1962
1963
1964
1965
1966
1967
1968
YEAR

DIGESTION


CONCENTRATION – %TS
10
9
8
7
6
5
4
3
2
1
0
RAW
DIGESTED
1962
1963
1964
1965
1966
1967
1968
YEAR

SLUDGE DIGESTION and DISPOSAL

MONTH	RAW SLUDGE			DIGESTED SLUDGE			SUPERNATANT		SLUDGE DISPOSAL	
	VOLUME 10^5 gal	T. S. %	V.S. %	VOLUME 10^5 gal	T. S. %	V.S. %	VOLUME 10^5 gal	T. S. %	LIQUID yd^3	DEWATERED yd^3
JAN	2.35	3.7	-	1.22	3.9	51	0	.04	724	0
FEB	1.69	5.3	-	.85	4.3	46	0	.62	506	0
MAR	1.92	-		.76	4.5	49	0	.03	454	0
APR	1.86	-	-	.60	4.9	49	0	.34	357	0
MAY	2.01	5.0	62	1.06	4.6	49	.24	.27	630	0
JUN	1.90	5.0	59	.42	6.3	48	.65	.16	390	0
JUL	1.92	4.6	58	.77	5.3	48	0	.02	459	0
AUG	2.11	5.5	54	.89	6.0	46	.17	.50	531	0
SEPT	1.87	5.2	54	.91	6.5	43	.61	.04	541	0
OCT	2.09	5.4	59	1.03	7.4	40	.31	.04	500	0
NOV	1.67	4.2	59	.79	6.0	41	0	.03	472	0
DEC	1.64	5.1	54	.83	6.2	40	0	-	494	0
TOTAL	23.03	-	-	10.13	-	-	1.98	-	6058	0
AVERAGE	1.91	4.9	57	.84	5.5	46	.16	.19	505	0

COMMENTS

A total of 2,303,000 gallons of raw sludge was pumped to the primary digester. This is approximately a 23% reduction from 1967. The average percent of total solids increased from 3.9 in 1967 to 4.9 in 1968 accounting for the volume reduction. The percent reduction of volatile matter averaged 23 for the year.

A total of 6058 cu. yd. of sludge was hauled by the sludge haulage contractor.

CONCLUSIONS

Apart from periodic upsets due to shock industrial loads, the Drury Lane Water Pollution Control Plant operated very efficiently during 1968 with resultant high removal efficiency of both BOD and suspended solids.

The routine industrial waste loading is tolerable if shock loadings can be eliminated.

Water management in Ontario